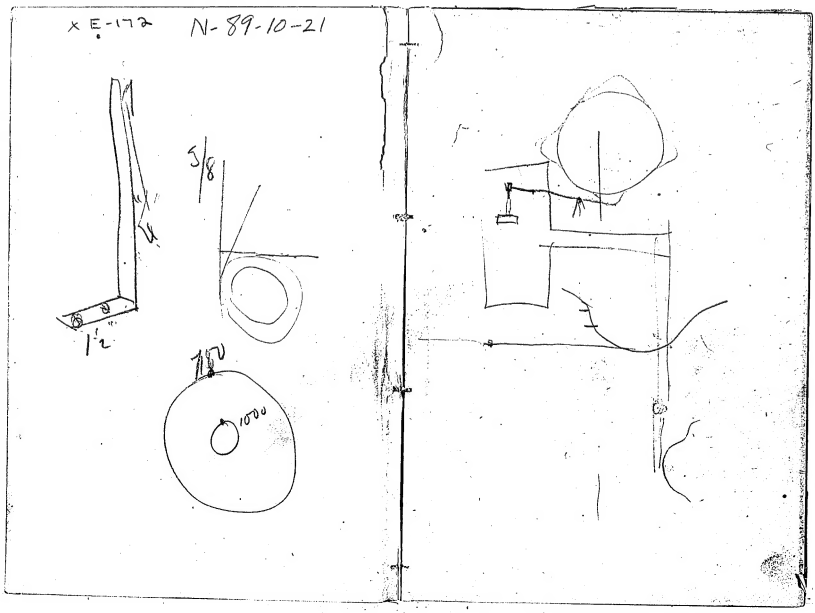
Notebook, N-89-10-21

The dated entries in this notebook are from October and December 1889. The book was used by Charles Batchelor, Arthur E. Kennelly, and another unidentified experimenter as a rough record book in the Galvanometer Room. Included are notes, drawings, and calculations regarding electric railway experiments and other electrical experiments. Transcriptions of the notes and calculations can be found in Arthur E. Kennelly Notebook #2. The front cover is labeled "#570." The spine is labeled "98." The pages are unnumbered, and several pages have been removed from the book. Approximately 60 pages have been used.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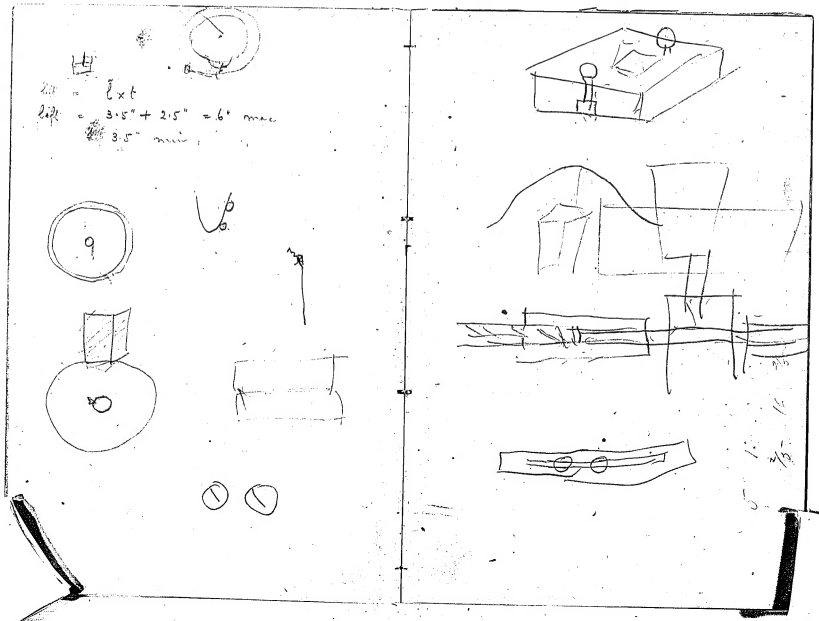

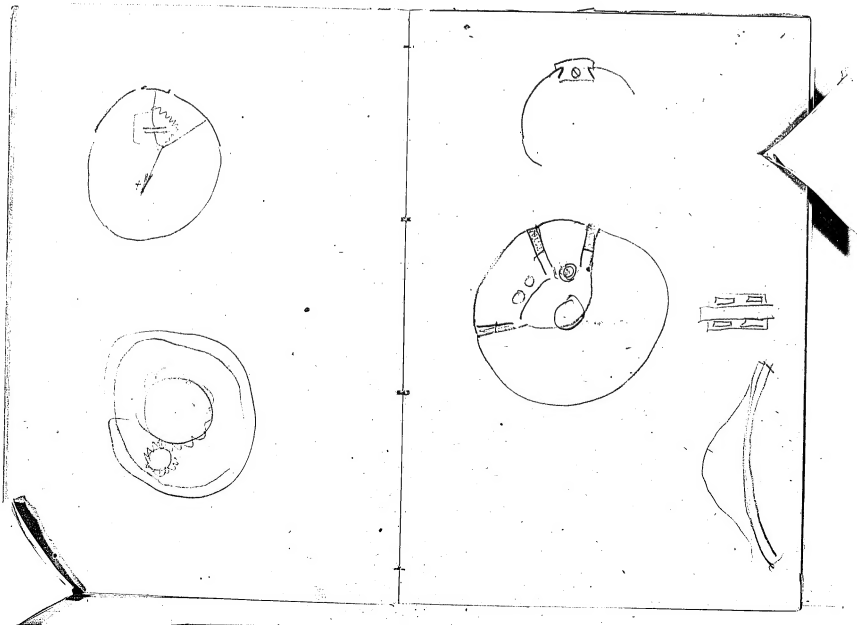

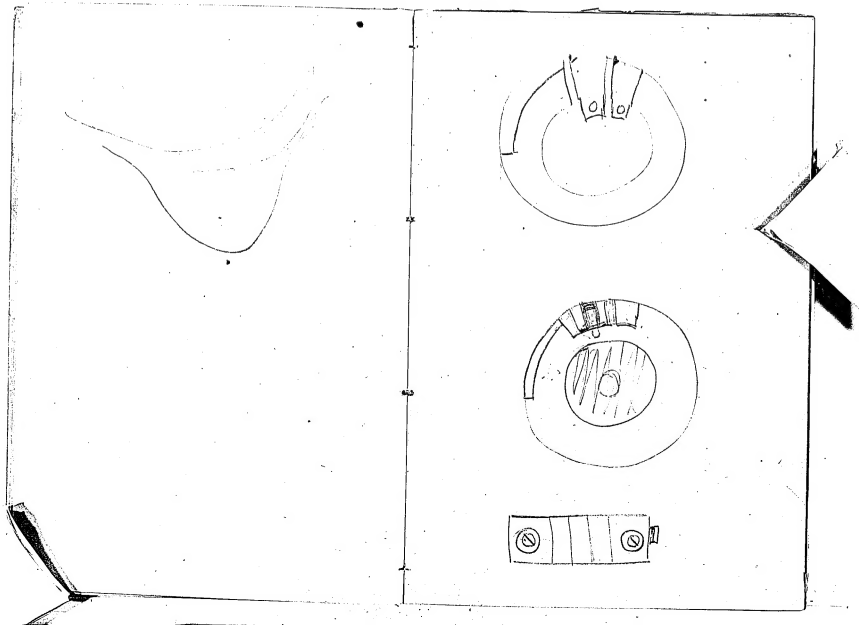

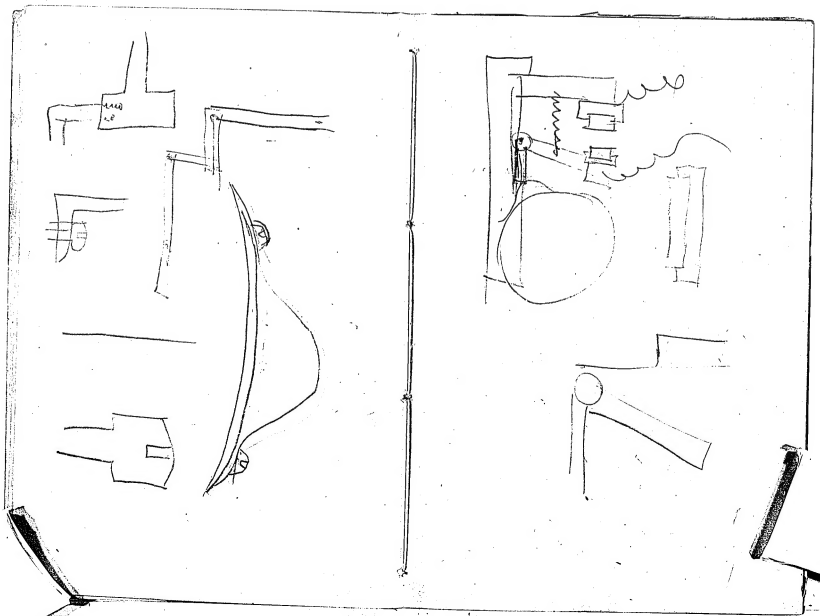

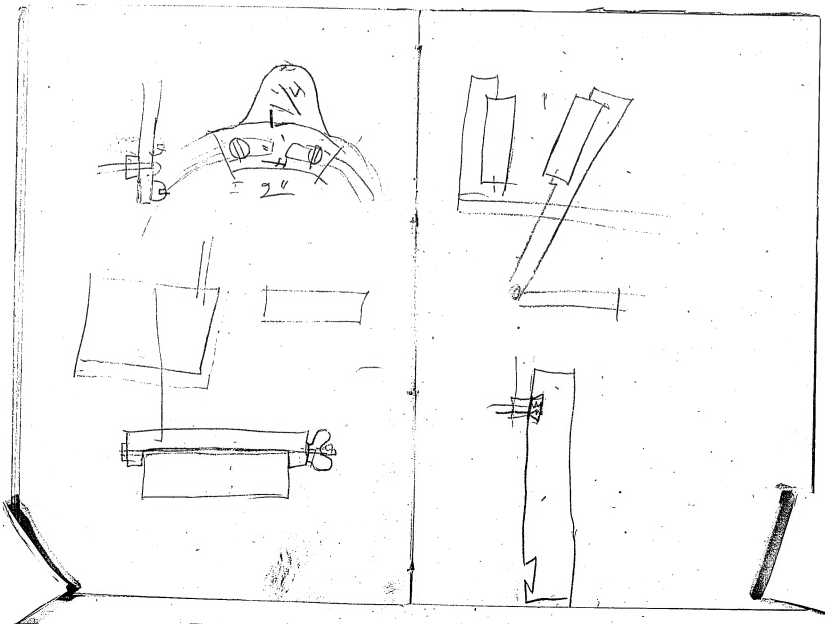
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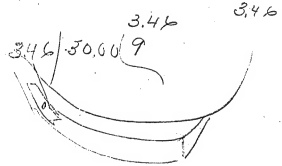

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2 7 1 8 6

9062 | 3.1416 | 3.46
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9062
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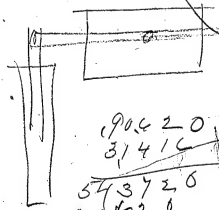

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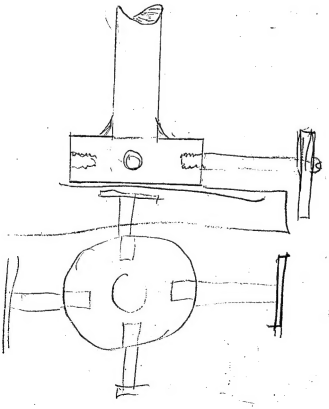

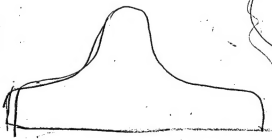

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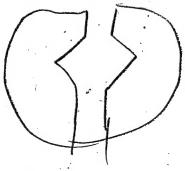

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3.46

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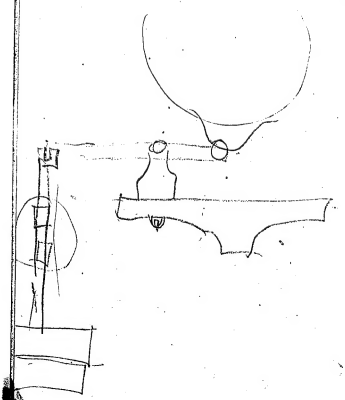

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7 7 4 8

4 9 7

3 7 3 0 1

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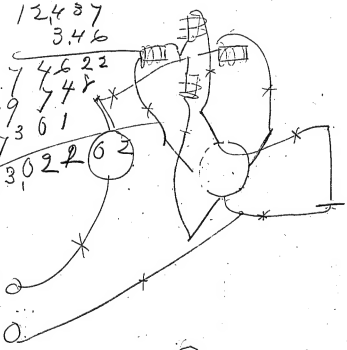

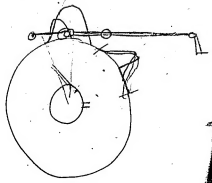

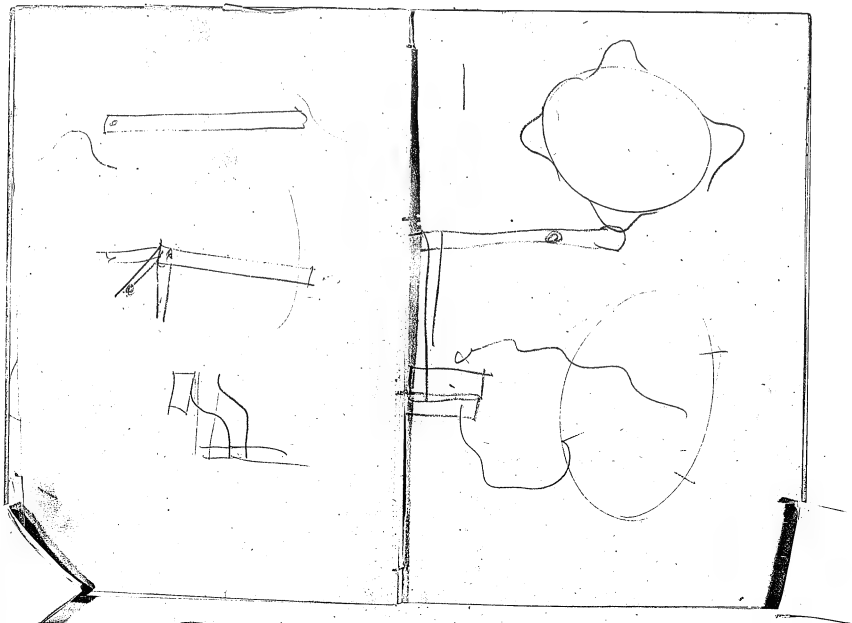

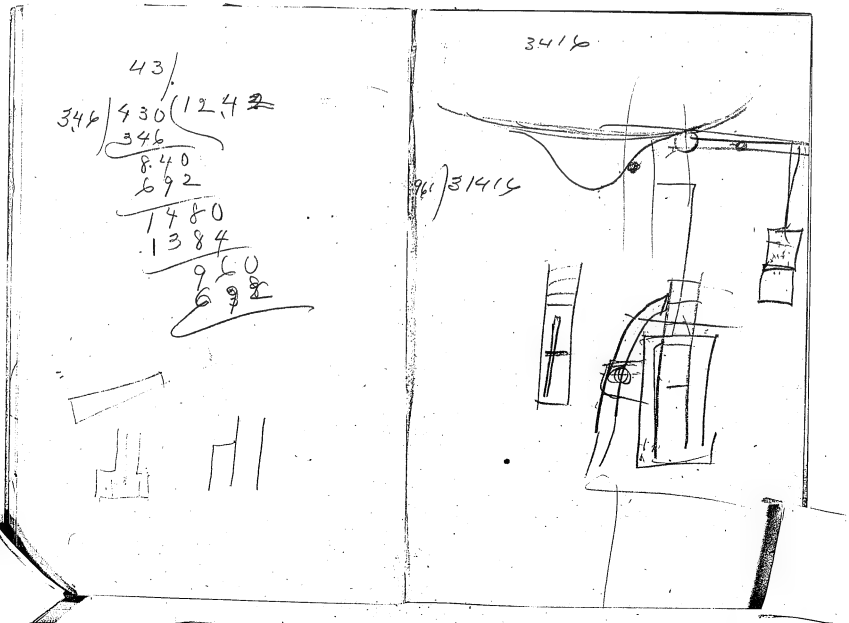
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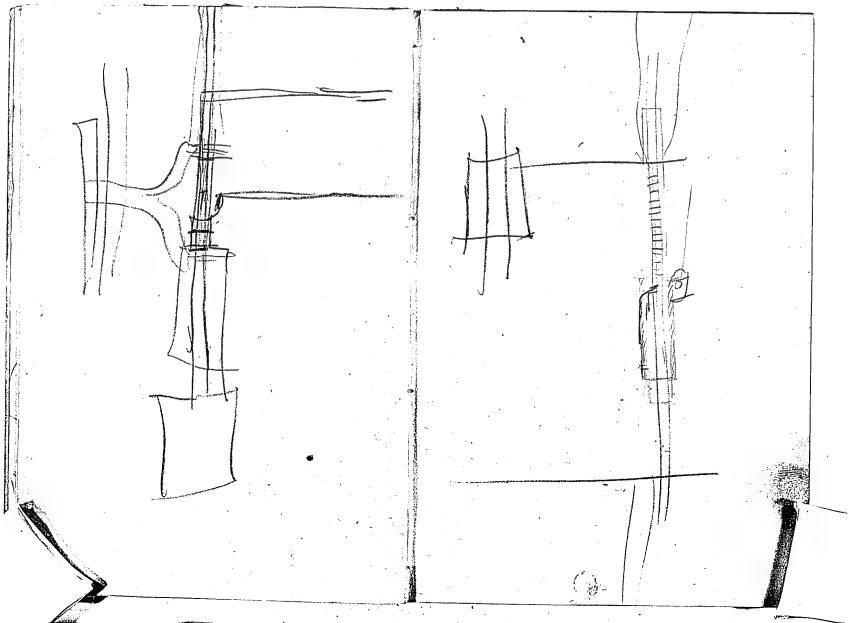

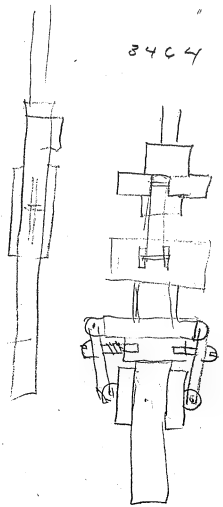

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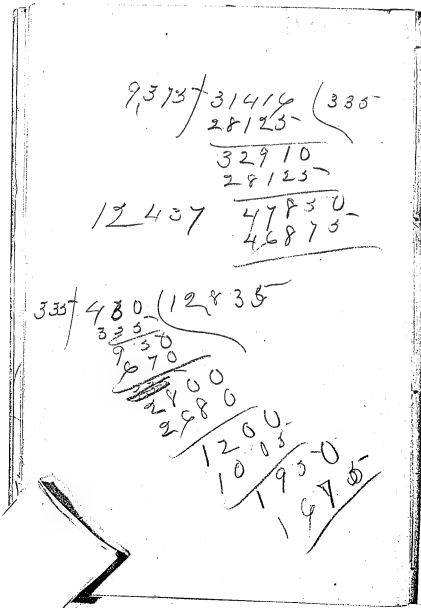
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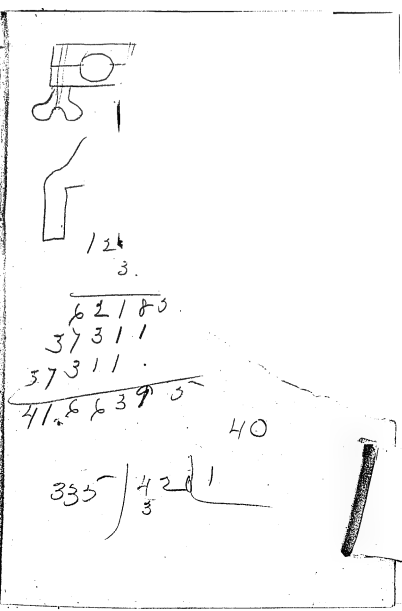
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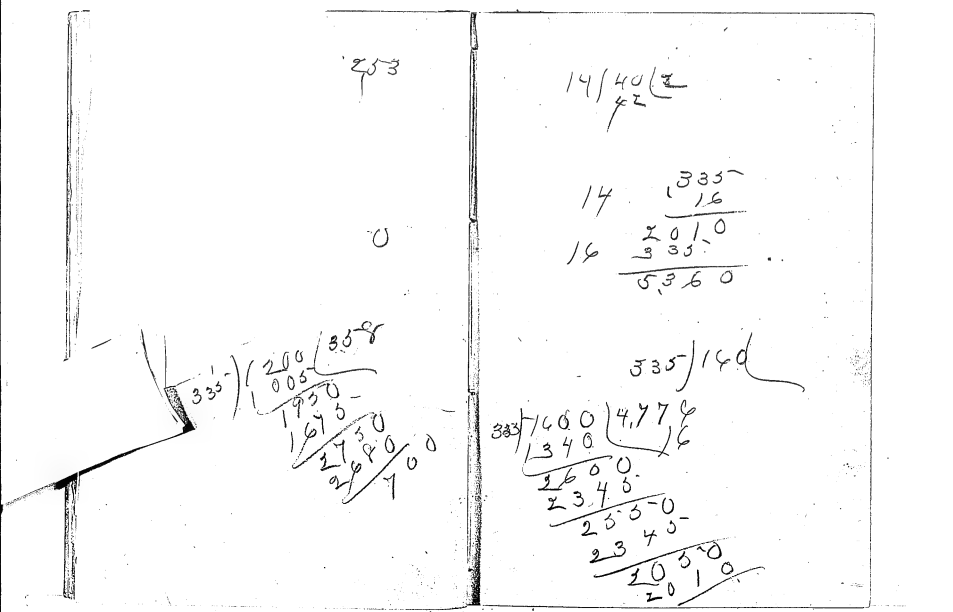
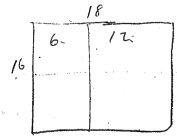


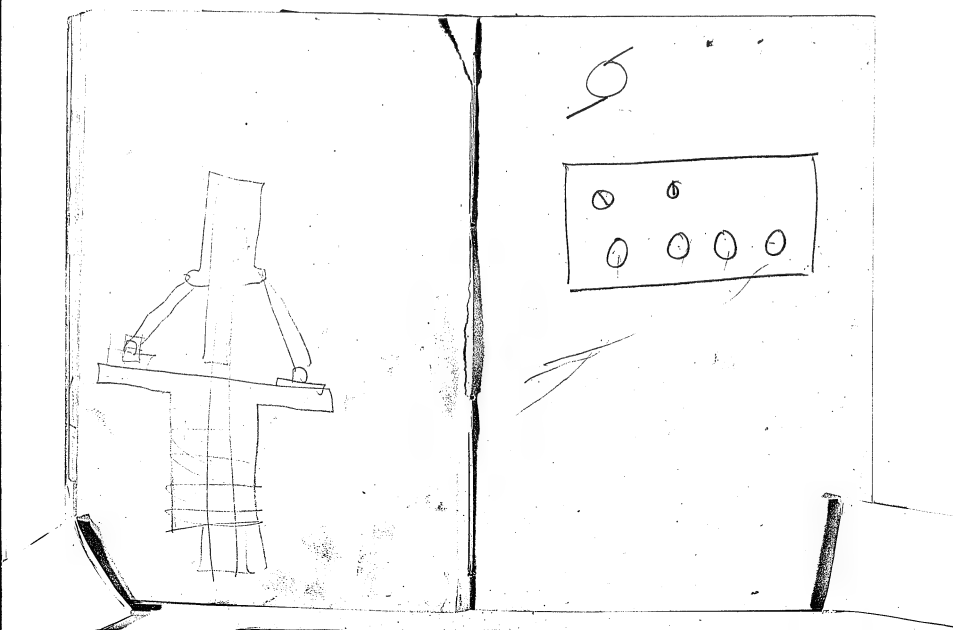
4 $12 \times 18 \times 2\frac{1}{2}$ X

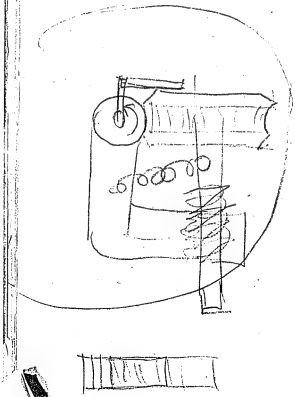
4 $12 \times 11 \times 2\frac{1}{2}$ $12 \times 12 \times 2$

2 $18 \times 16 \times 3$ $5\ 12 \times 16 \times 3$

$12 \times 16 \times 3$





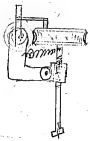


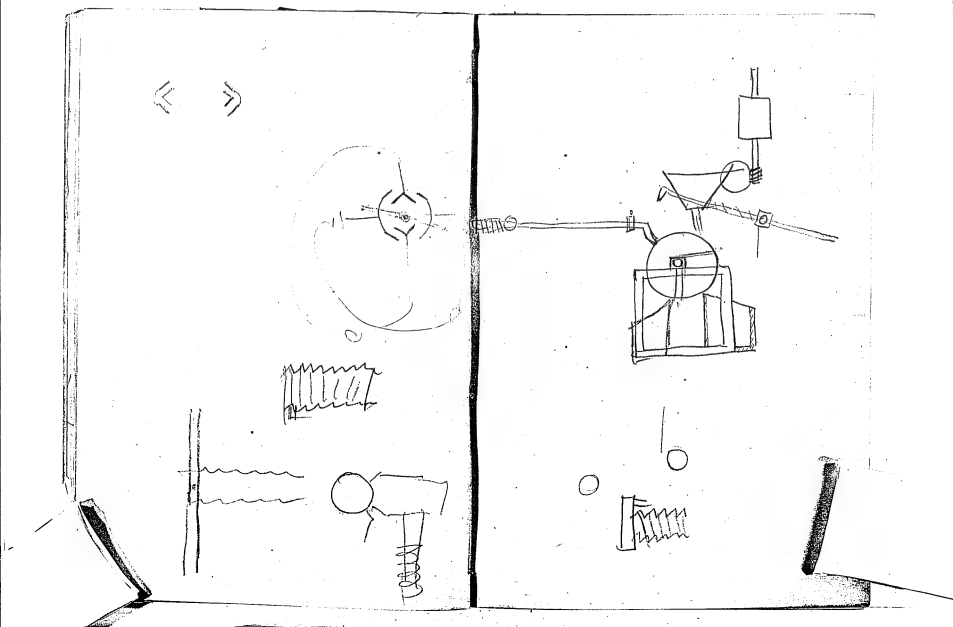
Car Brake
105 Teeth 2000 Rev Worm
Sprocket 5 to 1

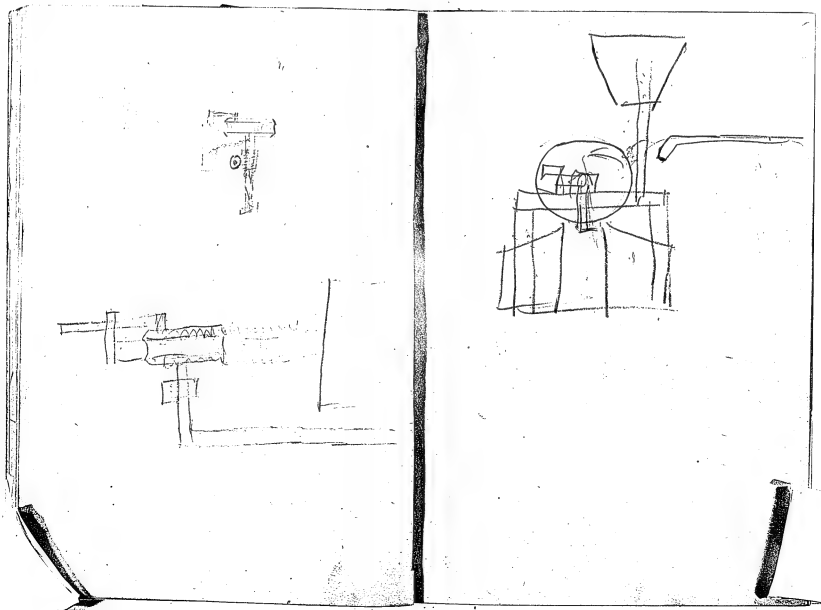
per min Motor worm 2000
Worm " 20
Brake wheel 7 about

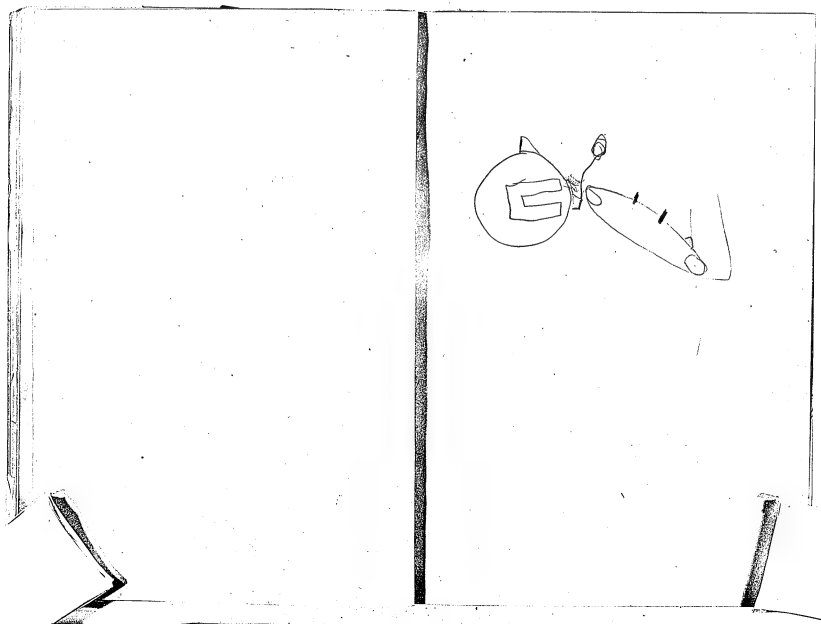
about 25 seconds or 8 seconds

50



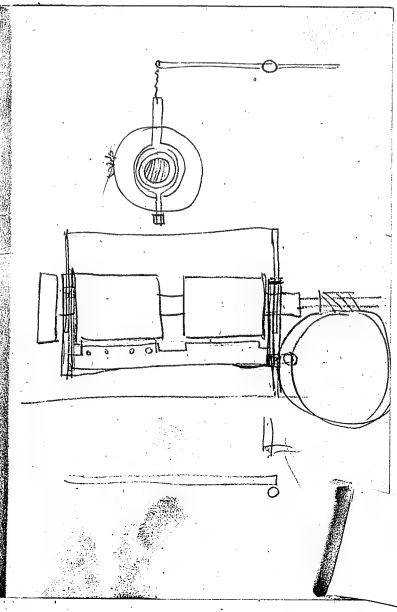


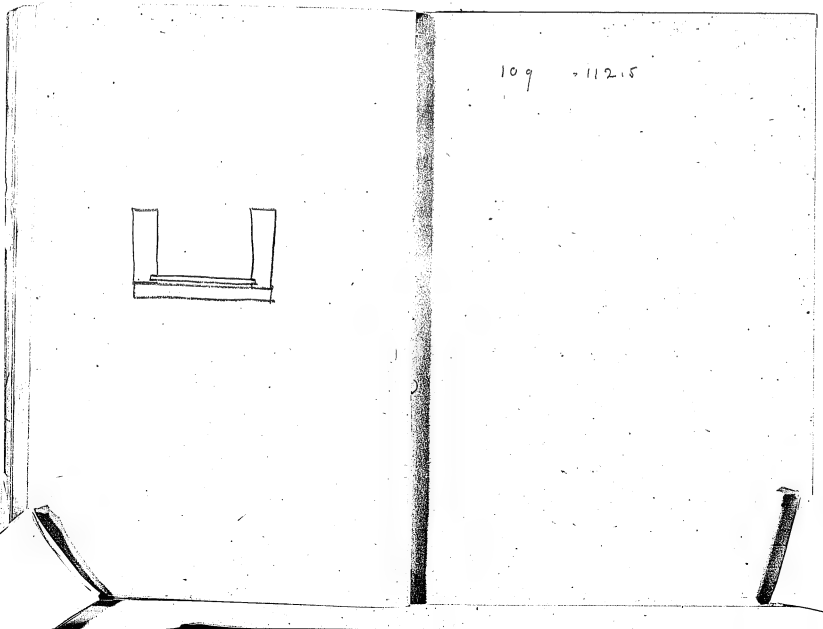




31.55 — 0.09

2 1 9.0




109 .1125

Running Cost

52 Sawmakers 4 cir 5 seconds

5 cir 60 seconds

Now of 5½

$$HP = \frac{P2 \cdot 3.1 \cdot \omega}{550}$$

$$\frac{32 \times 2.7 \times 3.1 \times 6.28}{15.5 \times 550 \times 12} = \frac{16830}{8526 \times 12} = \frac{1403}{8526}$$

$$= 0.165 \text{ HP}$$

$$\frac{52 \times 29.3 \times 19.5}{18.5 \times 6500} = \frac{28700}{1203} = 0.239$$

$$\frac{25.8 \times 28.5 \times 19.5}{16.3 \times 6500} \qquad \frac{10520}{10600} = .0.10$$

$$\frac{35.5 \times 26.5 \times 19.5}{14.8 \times 6500} \qquad \frac{18240}{9620} = 0.191$$

75)16500(186.1

503

58

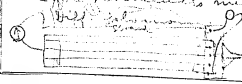
$\frac{58}{1}$

December 21. 1889.

A Strands of 7 bare soft Copper wires # 16 B.W.G. was stretched on stone Posts.

by its side at a marked with it there were stretched 7 single bare wires of the same Gauge, joined at both ends by pieces of bare Copper wire. All wires were straightened by an equal force applied at one end and produced by Brass Weights hanging over a wire passing over two pulleys.

At the bare copper wire was fastened at both ends of the wires, to which were connected the wires leading to Galvanometer. A Current of 20 cells was passed through the wires, the C. taken & closed, the resistances measured &



10 cells added to single wire side

500 div. total defl.
2 div. error
- on single wire side

Observed Current
4. 2

Length of
Single wires = bent on between points of Contact
Stranded wire ... 64.5 + slack
Weight of
Single Wires ... 850 g
Stranded wires 848.5 g
Single wire gauged to 65/1000"
Stranded Single wire 65/1000
Strands gauged to 0.190"
1 complete turn = 5.5 cm approx
of Strand
600 turns whole
Strand

With a flywheel
Let P be the force exerted at the
pitch circle in pounds of which
the flywheel is capable
Let Q be the force required at the
rim of the flywheel to overcome
the remaining resistances of the
engine when the load is
Then the frictional resistance
at the rim of the flywheel
is μQ lbs
If θ is the inclination of the
line of action of P to the
line of centres
Resolving forces perpendicular to
line of centres and the
forces exerted on the wheel on axis is $\mu P \cos\theta$
The forces resolved along the line of centres
$\frac{P}{\sin\theta}$ $P\cot\theta$
Motion takes place as soon as Q has
forces of resistance at least of equal
above moment
of forces where $Q = P\cot\theta + \mu P\csc\theta$
$= P\csc\theta\left(\frac{1}{\sin\theta} + \mu\cot\theta\right)$

$\therefore \frac{P}{Q} = \frac{1}{P\csc\theta\left(\frac{1}{\sin\theta} + \mu\cot\theta\right)}$

$= \frac{\tan\theta}{\csc\theta\left(1 + \mu\sin\theta\cos\theta\right)}$

$= \frac{\tan\theta}{1 + \mu\sin\theta\cos\theta}$ Let $\mu = \tan\phi$

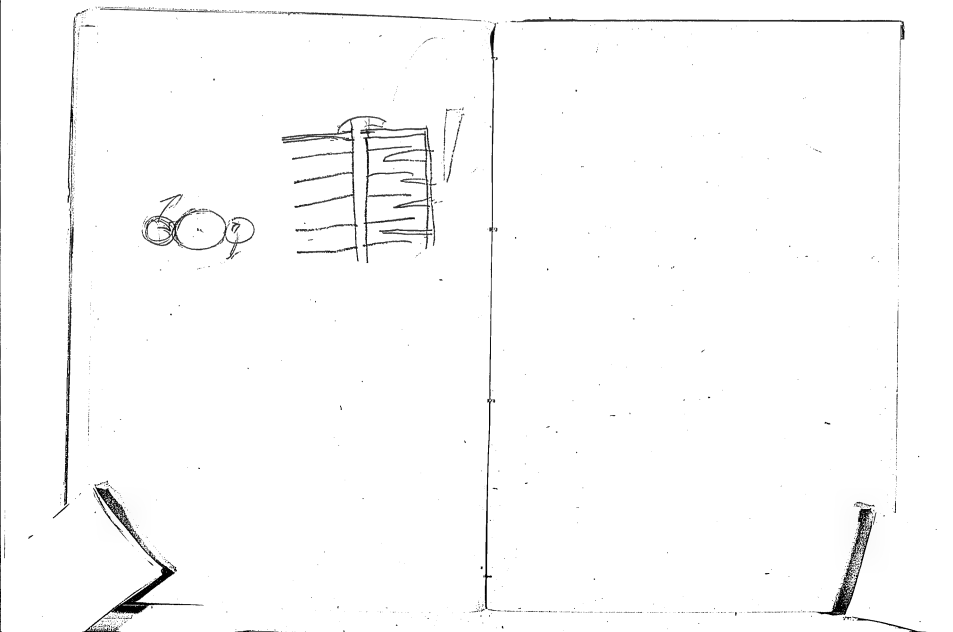
$= \frac{\tan\theta}{1 + \tan\phi\sin\theta\cos\theta}$

$= \frac{\frac{1}{\cos\theta}\tan\theta}{\frac{1}{\cos\theta} + \mu\tan\theta}$

$= \frac{\tan\theta}{\cos\theta}$ / $\sec\theta + \mu\tan\theta$ $= \frac{\sec\theta\tan\theta}{\tan^2\theta + 1 + \mu\tan\theta}$

$= \frac{(\tan^2\theta+1)\tan\theta}{(\tan^2\theta+1) + \mu\tan\theta}$ $= \frac{\tan\theta(\tan^2\theta+1)}{\mu\tan\theta + \tan^2\theta + 1}$

1.



20.0 volts on field

1.68 ohms 2.1 volts on [illegible]

113.5 - [illegible] per

193 revs per [illegible]

Speed 2050

Speed loaded

No load 1750 per min

Per [illegible] 16 volts @ M.T.

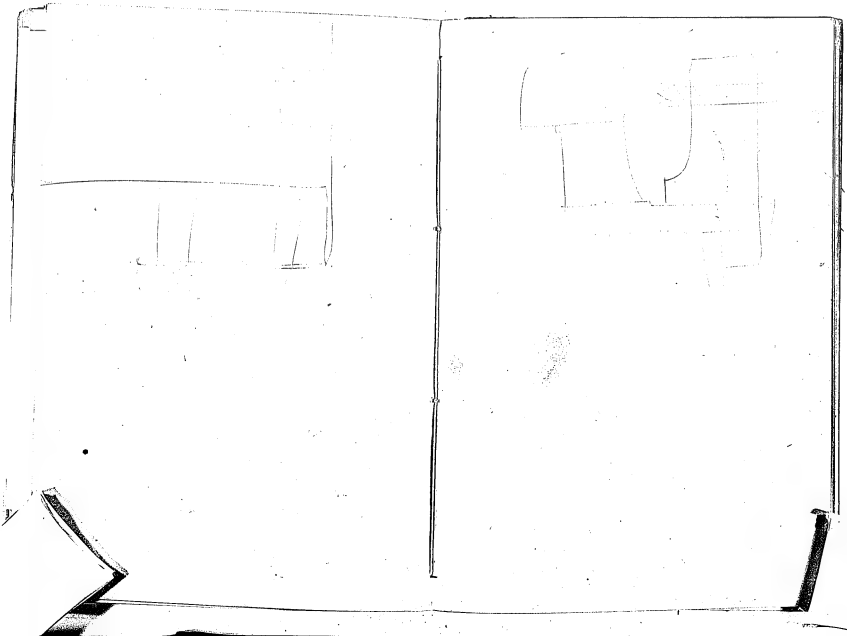
4400 275 amperes

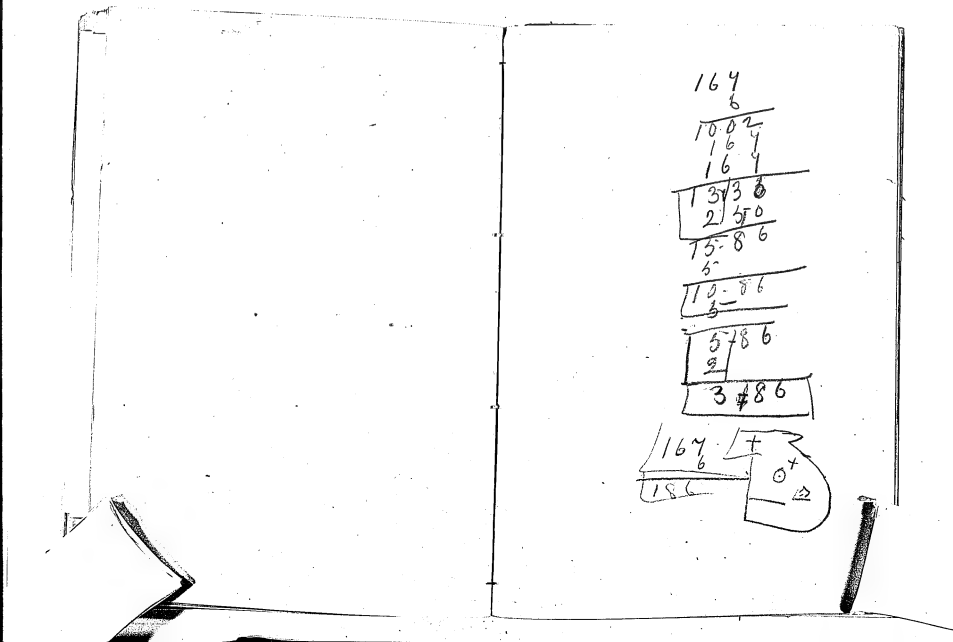
5.5 amperes @ H.P T

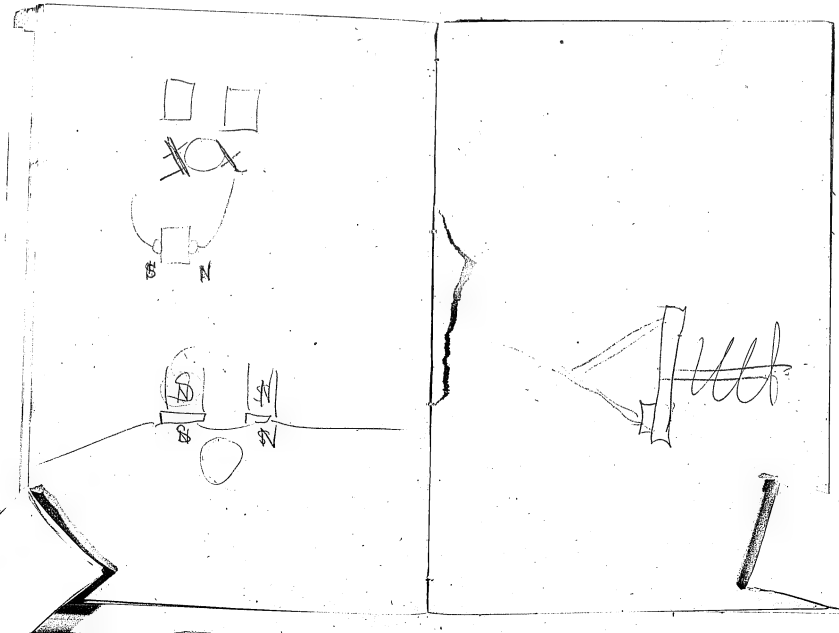
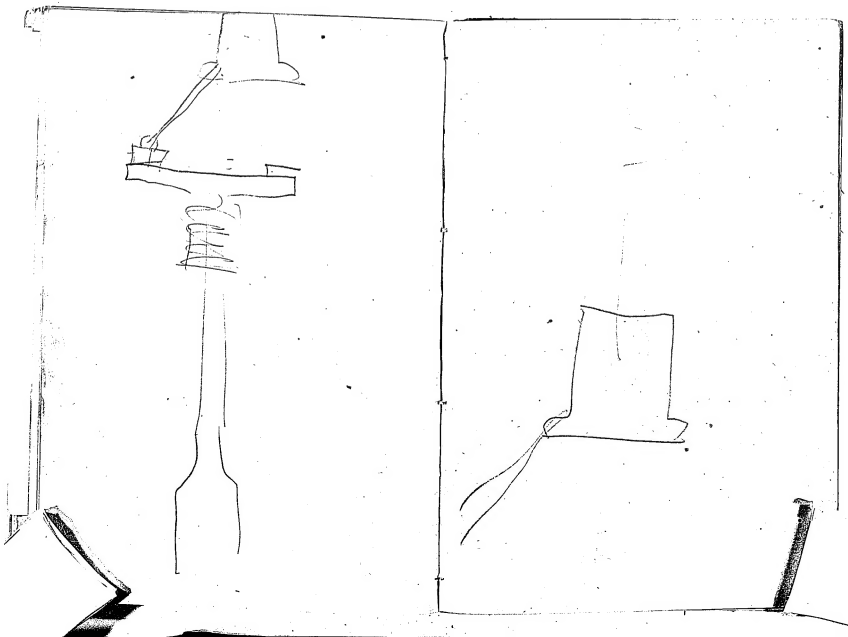
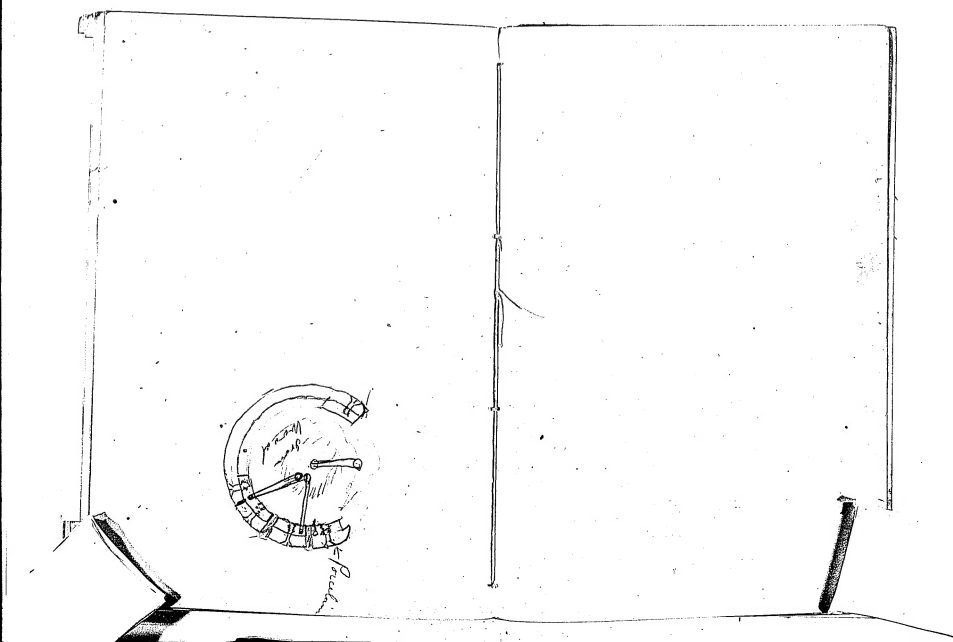
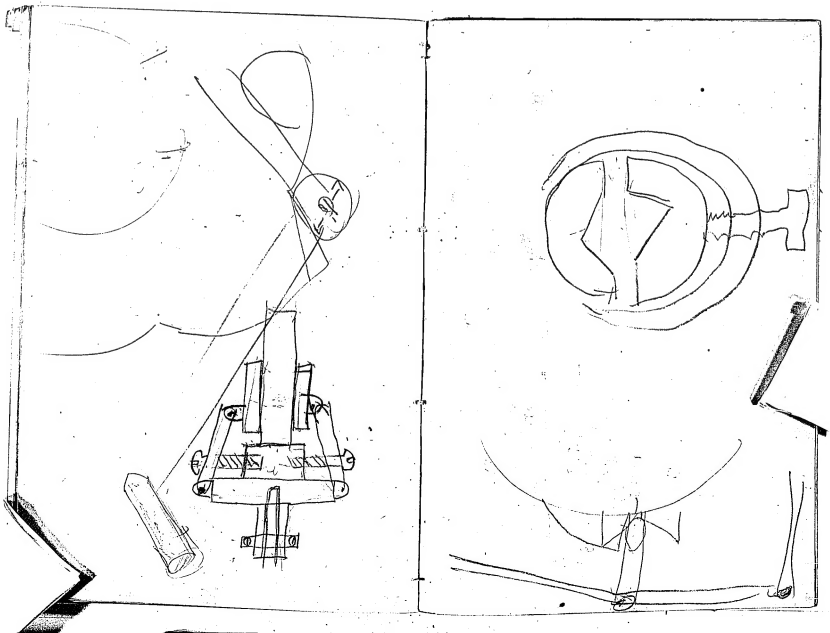
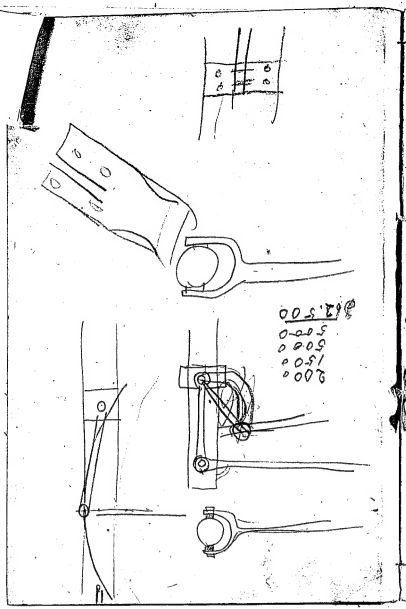
5500

1803 Shut down

16 Highest temp 130°F



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